EFFECT OF CHEMICAL TREATMENT ON RICE HUSK (RH) REINFORCED POLYETHYLENE (PE) COMPOSITES

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In this study rice husk reinforced polyethylene composites and their test specimens were manufactured using a single screw extruder and an injection molding machine, respectively. Raw rice husk was chemically treated with benzene diazonium salt in alkali, acidic, and neutral media, in order to improve in the mechanical properties. The mechanical properties of the composites prepared from alkaline media treated rice husk were found to increase substantially compared to those of acidic media, neutral media, and untreated ones. However, the values for the alkaline media treated rice husk-PE composites at all mixing ratios were found to be higher than those of treated acidic media, treated neutral media, and untreated rice husk composites respectively. The SEM micrographs reveal that interfacial bonding between the treated filler and the matrix has significantly improved, suggesting that better dispersion of the filler into the matrix was achieved upon treatment of rice husk. Based on filler loading, 35% filler reinforced composites had the optimum set of mechanical properties among all composites manufactured.

Keywords: Polymer matrix composites (PMCs); Mechanical properties; Scanning electron microscopy; Injection moulding

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INTRODUCTION

Recently there has been an increasing interest in the use of biodegradable polymers due to the serious environmental pollution arising from used and waste plastics, particularly polythene (PE). Biodegradable polymers can be obtained from renewable resources, microbially synthesized in the laboratory, or collected from petroluem-based chemicals (Premlal et al. 2002). Nowadays, synthetic polymers are combined with various biodegrable reinforcing fillers in order to improve the mechanical properties and obtain the bio-degradable and other characteristics demanded in actual applications (Yang et al. 2006, 2007; Choi et al. 2006). Research is being carried out to replace synthetic fibres with lignocellulosic fibres as reinforcing fillers (Thwe and Liao 2002; Park et al. 2003; Yang et al. 2004; Rana et al. 2003; Singleton et al. 2003). Compared to talc, silica, glass, carbon, and other synthetic fibres, the lignocellulosic fibres (corn stalk, rice husk, rice straw, wheat straw, grass, etc.) are lightweight, easily available, inexpensive, and contributing less wear of the machinery used for their production. Furthermore they are biodegradable and do not leave residues or resultant by-products that are toxic (Premlal et al. 2002; Vink et al. 2003). Besides, natural fibres as filler have